

LISTING OF CLAIMS

1. (Currently amended) A method of forming a conversion layer on a metallic surface comprising the steps of: treating the metallic surface with an aqueous treating solution consisting essentially of comprising:

(a) a source of ~~meta-tungstate~~ tungstate ions, wherein said source of tungstate ions is selected from the group consisting of ortho-tungstates, meta-tungstates and para-tungstates, polytungstates, heteropolytungstates, isopolytungstates, peroxytungstates, and combinations thereof;

(b) a soluble material comprising zirconium;

(c) optionally, a neutralization agent;

(d) optionally, a soluble aluminum salt; and

(e) optionally, one or more ingredients selected from the group consisting of surfactants, accelerators, dyes, organic polymers, buffering agents, and pH adjusting agents; and

thereafter drying and/or baking the treated metal surface.

2. (Currently amended) A method according to claim 1, wherein the neutralization agent is present and comprises ~~aqueous treating solution further comprises~~ ammonium hydroxide.

Claims 3-4. (canceled)

5. (Previously presented) A method according to claim 1, wherein the source of meta-tungstate ions is ammonium meta-tungstate.

6. (Canceled)

7. (Previously presented) A method according to claim 1, wherein the concentration of meta-tungstate ions, measured as tungsten, in the treating solution is about 0.01 g/l to about 10.0 g/l.
8. (Previously presented) A method according to claim 7, wherein the concentration of meta-tungstate ions, measured as tungsten, in the treating solution is about 0.1 g/l to about 1.5 g/l.
9. (Previously presented) A method according to claim 8, wherein the concentration of meta-tungstate ions, measured as tungsten, in the treating solution is 1.0 g/l.
10. (Original) A method according to claim 1, wherein the soluble material comprising zirconium is selected from the group consisting of zirconium ammonium fluoride, dihydrogen hexafluorozirconate, potassium hexafluorozirconate, zirconium sulfate, zirconium carbonate, zirconium nitrate, and zirconium phosphate.
11. (Original) A method according to claim 10, wherein the soluble material comprising zirconium is dihydrogen hexafluorozirconate.
12. (Original) A method according to claim 1, wherein the concentration of the soluble material comprising zirconium in the treating solution is about 0.01 g/l to about 2.0 g/l.
13. (Original) A method according to claim 12, wherein the concentration of the soluble material comprising zirconium in the treating solution is about 0.05 g/l to about 0.5 g/l.
14. (Canceled)

15. (Currently amended) A method according to claim 1 ~~14~~, wherein the concentration of the soluble aluminum salt is between 5 and 500 parts per million as aluminum.
16. (Original) A method according to claim 1, wherein the temperature of the treating solution is within the range of about 55°F to about 180°F.
17. (Original) A method according to claim 16, wherein the temperature of the treating solution is about 70°F to about 120°F.
18. (Original) A method according to claim 1, wherein the pH of the treating solution is maintained from about 2.8 to about 7.0.
19. (Original) A method according to claim 1, wherein the parts are cleaned prior to treating the metallic surface with the treating solution.
20. (Original) A method according to claim 19, wherein the metallic surface is deoxidized after cleaning and prior to treating with the treating solution.
21. (Original) A method according to claim 1, wherein the treating solution is free of chromium.
22. (Original) A method according to claim 1, wherein the treating solution is applied by immersion or by spraying.
23. (Canceled)
24. (Currently amended) An aqueous conversion coating composition ~~comprising a source of meta tungstate ions and a soluble material comprising zirconium~~ consisting essentially of:

(a) a source of tungstate ions, wherein said source of tungstate ions is selected from the group consisting of ortho-tungstates, meta-tungstates and para-tungstates, polytungstates, heteropolytungstates, isopolytungstates, peroxytungstates, and combinations thereof;

(b) a soluble material comprising zirconium;

(c) optionally, a neutralization agent;

(d) optionally, a soluble aluminum salt; and

(e) optionally, one or more ingredients selected from the group consisting of surfactants, accelerators, dyes, organic polymers, buffering agents, and pH adjusting agents.

25. (Currently amended) A composition according to claim 24, wherein the neutralization agent is present and comprises ~~aqueous treating solution further comprises~~ ammonium hydroxide.

Claims 26-27. (canceled)

28. (Previously presented) A composition according to claim 24, wherein the source of meta-tungstate ions is ammonium meta-tungstate.

29. (Canceled)

30. (Previously presented) A composition according to claim 24, wherein the concentration of meta-tungstate ions, measured as tungsten, in the treating solution is about 0.01 g/l to about 10.0 g/l.

31. (Previously presented) A composition according to claim 30, wherein the concentration of meta-tungstate ions, measured as tungsten, in the treating solution is about 0.1 g/l to about 1.5 g/l.

32. (Previously presented) A composition according to claim 31, wherein the concentration of meta-tungstate ions, measured as tungsten, in the treating solution is 1.0 g/l.

33. (Original) A composition according to claim 24, wherein the soluble material comprising zirconium is selected from the group consisting of zirconium ammonium fluoride, dihydrogen hexafluorozirconate, potassium hexafluorozirconate, zirconium sulfate, zirconium carbonate, zirconium nitrate, and zirconium phosphate.

34. (Original) A composition according to claim 33, wherein the soluble material comprising zirconium is dihydrogen hexafluorozirconate.

35. (Original) A composition according to claim 24, wherein the concentration of the soluble material comprising zirconium in the treating solution is about 0.01 g/l to about 2.0 g/l.

36. (Original) A composition according to claim 35, wherein the concentration of the soluble material comprising zirconium in the treating solution is about 0.05 g/l to about 0.5 g/l.

37. (Canceled)

38. (Currently amended) A composition according to claim 24 ~~37~~, wherein the concentration of the soluble aluminum salt is between 5 and 500 parts per million as aluminum.

Claims 39-40. (canceled)

41. (Original) A composition according to claim 24, wherein the pH of the treating solution is maintained from about 2.8 to about 7.0.

42. (Original) A composition according to claim 24, wherein the treating solution is free of chromium.
43. (Original) A composition according to claim 24, wherein the treating solution further comprises at least one of a surfactant, an accelerator, a dye, an organic polymer, a buffering agent, and a pH adjusting agent.
44. (Previously presented) A method of forming a conversion layer on a metallic surface comprising the steps of: treating the metallic surface with an aqueous treating solution comprising:
- (a) a source of tungstate ions;
 - (b) a soluble material comprising zirconium; and
 - (c) 5 and 500 parts per million of a soluble aluminum salt; and thereafter drying and/or baking the treated metal surface.
45. (Previously presented) A method according to claim 44, wherein the aqueous treating solution further comprises ammonium hydroxide.
46. (Previously presented) A method according to claim 44, wherein the source of tungstate ions is selected from the group consisting of ortho-tungstates, meta-tungstates and para-tungstates, polytungstates, heteropolytungstates, isopolytungstates, peroxytungstates, and combinations thereof.
47. (Previously presented) A method according to claim 46, wherein the source of tungstate ions is selected from the group consisting of sodium, potassium, lithium, calcium, cerium, barium, magnesium, strontium, hydrogen and ammonium tungstate salts.

48. (Previously presented) A method according to claim 47, wherein the source of tungstate ions is ammonium meta-tungstate.
49. (Previously presented) A method according to claim 44, wherein the soluble material comprising zirconium is dihydrogen hexafluorozirconate.
50. (Previously presented) A method according to claim 44, wherein the treating solution further comprises at least one of a surfactant, an accelerator, a dye, an organic polymer, a buffering agent, and a pH adjusting agent.
51. (Previously presented) An aqueous conversion coating composition comprising a source of tungstate ions, a soluble material comprising zirconium, and 5 to 100 parts per million of a soluble aluminum salt.
52. (Previously presented) A composition according to claim 51, wherein the aqueous treating solution further comprises ammonium hydroxide.
53. (Previously presented) A composition according to claim 51, wherein the source of tungstate ions is selected from the group consisting of ortho-tungstates, meta-tungstates and para-tungstates, polytungstates, heteropolytungstates, isopolytungstates, peroxytungstates, and combinations thereof.
54. (Previously presented) A composition according to claim 53, wherein the source of tungstate ions is selected from the group consisting of sodium, potassium, lithium, calcium, cerium, barium, magnesium, strontium, hydrogen and ammonium tungstate salts.
55. (Previously presented) A composition according to claim 54, wherein the source of tungstate ions is ammonium meta-tungstate.

56. (Previously presented) A composition according to claim 51, wherein the soluble material comprising zirconium is dihydrogen hexafluorozirconate.

57. (Previously presented) A composition according to claim 51, wherein the treating solution further comprises at least one of a surfactant, an accelerator, a dye, an organic polymer, a buffering agent, and a pH adjusting agent.

58. (New) A method according to claim 1, wherein the soluble aluminum salt is selected from the group consisting of aluminum ammonium chloride, aluminum ammonium sulfate, aluminum nitrate, aluminum potassium sulfate, and aluminum sulfate.

59 (New) A composition according to claim 24, wherein the soluble aluminum salt is selected from the group consisting of aluminum ammonium chloride, aluminum ammonium sulfate, aluminum nitrate, aluminum potassium sulfate, and aluminum sulfate.